

What is claimed is:

1. A cleaning process of exhaust gas which comprises the steps of: bringing exhaust gas containing at least one of nitrogen oxides or organic solvent into contact with a cleaning agent comprising metal as a reductive cleaning agent component and metal oxide as an oxidative cleaning agent component or comprising lower valent metal oxide as a reductive cleaning agent component and higher valent metal oxide as an oxidative cleaning agent component while heating them,

conducting at least one of reduction of nitrogen oxides by the reductive cleaning agent component or oxidative decomposition of organic solvent by the oxidative cleaning agent component,

simultaneously detecting a variation of a constitutional ratio between the reductive cleaning agent component and the oxidative cleaning agent component with the progress of oxidation-reduction reaction,

supplying correction gas when the constitutional ratio deviates from a predetermined control range, and

restoring the constitutional ratio within the control range.

2. A cleaning process of exhaust gas which comprises the steps of: bringing at least two kinds selected from the exhaust gas containing nitrogen oxides and organic solvent, the exhaust gas containing nitrogen oxides and the exhaust gas containing organic solvent into contact alternatively or at random with a cleaning

agent comprising metal as a reductive cleaning agent component and metal oxide as an oxidative cleaning agent component or comprising lower valent metal oxide as a reductive cleaning agent component and higher valent metal oxide as an oxidative cleaning agent component while heating them, conducting at least one of reduction of nitrogen oxides by the reductive cleaning agent component or oxidative decomposition of organic solvent by the oxidative cleaning agent component, simultaneously detecting a variation of a constitutional ratio between the reductive cleaning agent component and the oxidative cleaning agent component with the progress of oxidation-reduction reaction, supplying correction gas when the constitutional ratio deviates from a predetermined control range, and restoring the constitutional ratio within the control range.

3. The cleaning process according to Claim 1 or Claim 2, wherein said variation of the constitutional ratio is detected by analyzing gas after passing through said cleaning agent or by analyzing gas sampled from downstream stratum of said cleaning agent.

4. The cleaning process according to Claim 1 or Claim 2, wherein said variation of the constitutional ratio is detected by sensing the color change of a detecting agent filled in downstream stratum of said cleaning agent, a detecting agent filled in a pipe at downstream side of said cleaning agent, or a detecting agent filled

in a by-pass pipe disposed at downstream stratum of said cleaning agent.

5. The cleaning process according to Claim 1 or Claim 2, wherein said variation of the constitutional ratio is detected by the variation of the electric resistance of said cleaning agent.

6. The cleaning process according to Claim 1 or Claim 2, wherein said variation of the constitutional ratio is detected by the calculation from the treated amount of the exhaust gas.

7. The cleaning process according to Claim 1 or Claim 2, wherein said organic solvent is at least one kind selected from ethers, alcohols, ketones, esters and hydrocarbons each having boiling point at the temperature of 40 °C to 140 °C under ordinary pressure.

8. The cleaning process according to Claim 1 or Claim 2, wherein said correction gas is oxygen or air and converts metal into metal oxide.

9. The cleaning process according to Claim 1 or Claim 2, wherein said correction gas is oxygen or air and converts lower valent metal oxide into higher valent metal oxide.

10. The cleaning process according to Claim 1 or Claim 2, wherein

said correction gas is one or more of hydrogen, ethers, alcohols, ketones, esters or hydrocarbons and converts metal into metal oxide.

11. The cleaning process according to Claim 1 or Claim 2, wherein said correction gas is one or more of hydrogen, ethers, alcohols, ketones, esters or hydrocarbons and converts lower valent metal oxide into higher valent metal oxide.

12. The cleaning process according to Claim 1 or Claim 2, wherein said constitutional ratio between metal and metal oxide is settled within the control range from 5/95 to 95/5 by mole ratio.

13. The cleaning process according to Claim 1 or Claim 2, wherein said constitutional ratio between lower valent metal oxide and higher valent metal oxide is settled within the control range from 5/95 to 95/5 by mole ratio.

14. The cleaning process according to Claim 1 or Claim 2, wherein said metal and said metal oxide is supported by an inorganic carrier.

15. The cleaning process according to Claim 1 or Claim 2, wherein said lower valent metal oxide and said higher valent metal oxide are supported by an inorganic carrier.

16. The cleaning process according to Claim 1 or Claim 2, wherein

the combination of said metal and said metal oxide is Cu and CuO, Ni and NiO, Ru and RuO₂ or Ag and Ag₂O.

17. The cleaning process according to Claim 1 or Claim 2, wherein the combination of said lower valent metal oxide and said higher valent metal oxide is MnO and Mn₂O₃, FeO and Fe₂O₃, CoO and Co₂O₃, CrO and Cr₂O₃, MoO₂ and MoO₃ or Ce₂O₃ and CeO₂.

18. The cleaning process according to Claim 1 or Claim 2, wherein said cleaning is carried out at the temperature of from 100 °C to 800 °C.